WHAT IS CLAIMED IS:

1. A method for converting a sour natural gas stream into syngas containing hydrogen, methane, carbon monoxide and carbon dioxide, said syngas being substantially free of hydrogen sulfide, said sour natural gas containing hydrogen sulfide (H_2S) to methane of at least 0.1 moles of hydrogen sulfide per mole of methane, said method comprising the steps of:

reforming a feed stream containing said sour natural gas and steam, by passing said feed stream over a catalyst chosen from the group of nickel-based reforming catalysts and noble metal based reforming catalysts and a metal-based catalyst to capture the sulfur by forming a metal sulfide, metal-based catalyst chosen from the group of NiO, Fe_2O_3, MnO, CuO, CoO, CdO and ZnO and mixtures thereof, and Fe_2O_3, MnO, CuO, CoO, CdO and ZnO and mixtures thereof supported on an inert carrier catalyst;

regenerating said metal-based catalyst by contacting said metal sulfide formed during the reforming step with air, the switching between the reforming and the regenerating modes being adjusted so that the heat consumed in the reforming step is balanced by heat liberated in the regeneration step.

2. A method according to claim 1, wherein said sour natural gas stream has a ratio of hydrogen sulfide to methane of at least 0.1 moles of hydrogen sulfide per mole of methane.

3. A method according to claim 1, wherein said reforming catalyst is noble metal based, the sulfur capture catalyst is chosen from the group, NiO MnO, CuO, CoO, CdO and ZnO, and wherein the sour gas has a ratio at least 0.3 moles of hydrogen sulfide per mole of methane.

4. A method according to claim 1, wherein a continuous stream of syngas is produced by repeatedly cycling multiple reactors between said reforming, and regenerating steps.

5. A method according to claim 4, wherein said reforming catalyst and sulfur capture catalyst are the same nickel-based material, wherein the reforming and regenerations step are carried out at a temperature of at least 700°C, wherein the pressure during the reforming step is at least 100 atmospheres, and wherein SO_2 is removed from the vitiated air produced in the regeneration step by passing said vitiated air through a bed of $CaCO_3$.

6. A method according to claim 5, wherein said bed of $CaCO_3$ is fluidized, operated at a pressure in the range of 3 to 10 atmospheres and used to generate power via a gas turbine.